



PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B65D 79/00</b>	<b>A1</b>	(11) International Publication Number: <b>WO 95/05326</b> (43) International Publication Date: <b>23 February 1995 (23.02.95)</b>												
<p>(21) International Application Number: <b>PCT/GB94/01756</b></p> <p>(22) International Filing Date: <b>11 August 1994 (11.08.94)</b></p> <p>(30) Priority Data:</p> <table border="0"> <tr> <td>9316732.8</td> <td>12 August 1993 (12.08.93)</td> <td>GB</td> </tr> <tr> <td>9318957.9</td> <td>14 September 1993 (14.09.93)</td> <td>GB</td> </tr> <tr> <td>9401168.1</td> <td>21 January 1994 (21.01.94)</td> <td>GB</td> </tr> <tr> <td>9413741.1</td> <td>7 July 1994 (07.07.94)</td> <td>GB</td> </tr> </table> <p>(71) Applicants (for all designated States except US): <b>WHITBREAD PLC [GB/GB]; Brewery, Chiswell Street, London EC1Y 4SD (GB). HEINEKEN TECHNICAL SERVICES B.V. [NL/NL]; 2E Weteringplantsoen 21, NL-1017 ZD Amsterdam (NL).</b></p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): <b>WRIGHT, Timothy [GB/GB]; Rushcote Grange, 1200 Warwick Road, Knowle, Solihull B93 9LL (GB). SILLINCE, Mark, Erich [GB/GB]; 3 Orchard Way, Stanbridge, Leighton Buzzard, Bedfordshire LU7 9JE (GB). ROSENS, Erwin, Anton [NL/NL]; Klaverhof 108, NL-2403 XH Alphen AA de Rijn (NL).</b></p> <p>(74) Agent: <b>GILL JENNINGS &amp; EVERY; Broadgate House, 7 Eldon Street, London EC2M 7LH (GB).</b></p>		9316732.8	12 August 1993 (12.08.93)	GB	9318957.9	14 September 1993 (14.09.93)	GB	9401168.1	21 January 1994 (21.01.94)	GB	9413741.1	7 July 1994 (07.07.94)	GB	<p>(81) Designated States: <b>AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD).</b></p> <p><b>Published</b> <i>With international search report.</i></p>
9316732.8	12 August 1993 (12.08.93)	GB												
9318957.9	14 September 1993 (14.09.93)	GB												
9401168.1	21 January 1994 (21.01.94)	GB												
9413741.1	7 July 1994 (07.07.94)	GB												
<p>(54) Title: <b>CARBONATED BEVERAGE CONTAINER</b></p> <p>(57) Abstract</p> <p>A carbonated beverage container (10, 35, 40) including a hollow insert (1, 20). The insert (1, 20) has one one-way valve (7, 29, 31, 32) and one orifice (6, 28, 33, 34), one of which is arranged to allow gas from a headspace above beverage (11) to enter the insert (1, 20), and the other is arranged to jet gas from inside the insert (1, 20) into the beverage (11) upon opening the container (10, 35, 40). The gas jetting into the beverage (11) causes nucleation of fine bubbles in the beverage (11) which separate out to form a close-knit creamy head.</p> <div data-bbox="1169 1155 1477 2058"> </div>														

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LJ	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

## Carbonated beverage container.

TECHNICAL FIELD

5           The present invention relates to a beverage container for a carbonated beverage which enables a close-knit creamy head to be formed on the beverage as it is dispensed so that it has an appearance similar to that of a beverage dispensed from draught.

10

BACKGROUND ART

          Such an appearance can be generated by causing shear in the beverage, which encourages the liberation of small  
15       bubbles of gas from the beverage, and these gradually separate out to form the head.

          GB-A-1266351 discloses a number of beverage containers where a secondary chamber is provided which contains gas  
20       charged to a pressure substantially above atmospheric pressure. In one example, the secondary chamber is permanently in communication with the container via a restricted orifice and is charged with gas under pressure at the time of filling of the container. In another  
25       example, the secondary chamber is filled with gas and the restricted orifice sealed with gelatine or other non-toxic substance which is intended to retain the gas under pressure within the secondary chamber prior to and during filling but which dissolves after contact with the beverage  
30       for a period of time to open the restricted orifice. In a further example, the restricted orifice is provided in a flexible wall of the chamber which is exposed to the pressure in the main body of the container, the arrangement being such that pressure in the main body of the container  
35       holds the region of the wall around the restricted orifice sealed against a grommet until the container is opened, whereupon the resultant release of pressure results in the

seal being broken and permits the gas under pressure from the secondary chamber to jet into the beverage through the restricted orifice. For a variety of reasons, none of these designs have met with commercial success.

5

GB-A-2,183,592 discloses a beverage container wherein, instead of gas being jetted from the secondary chamber by way of a restricted orifice, carbonated beverage or carbonated beverage followed by gas, is jetted through a  
10 restricted orifice to induce fine bubble formation in the main body of the beverage. This system has been commercialised, but it is widely accepted that jetting gas only rather than carbonated beverage or carbonated beverage followed by gas, provides better bubble nucleation and  
15 hence better head formation. GB-A-2,183,592 discloses a number of constructions wherein the secondary chamber may be constructed as an integral part of the beverage container or it may be formed as a discrete insert which is deposited or pushed into a conventional form of can, bottle  
20 or carton. Preference is expressed in GB-A-2,183,592 for an insert which is retained in position, for example at the bottom of the container, by an appropriate adhesive or by mechanical means. However, there is described the possibility of using a discrete insert which may be  
25 suspended or float in the beverage in the container provided that the restricted orifice is maintained below the surface of the beverage in the container on opening the container. The possibility of loading or weighting the insert to orientate the position of the restricted orifice  
30 is described.

EP-A-0,520,646 describes another proposal in which a beverage container has an insert with a restricted orifice which is arranged to jet gas only into the beverage. This  
35 insert is charged with gas by inverting the container promptly after it has been filled with beverage and the headspace above the beverage in the container pressurised

so that the restricted orifice is exposed to pressure within the headspace above the beverage in the inverted container. Failure to ensure that the container remains inverted during the pressurization stages, including  
5 pasteurisation, results in the insert being filled with a significant amount of beverage, thereby losing all the benefits to be achieved by ejection of gas only under pressure from the insert when the container is opened. In practice, this can occur when there is an unforeseen  
10 production line stoppage which results in containers being stopped before inversion. Additionally, during pasteurisation, containers frequently fall over and are pasteurised on their side, in which orientation it is possible for substantial amounts of the beverage to enter  
15 the insert, especially since a high pressure exists in the container as a result of heating of the sealed container to the pasteurisation temperature.

WO-A-91/07326 discloses a system in which an insert  
20 which jets gas only into the beverage in the main body of the container is pre-pressurized with gas and includes closure means. The closure means remains sealed before filling and during the container filling operation but when the beverage container is subsequently opened,  
25 de-pressurization of the beverage container results in the insert releasing a surge of gas from a restricted orifice into the beverage to "seed" the required nucleation of dissolved gas bubbles to produce the required rich creamy foam. This system has met with considerable commercial  
30 success. Since the insert is sealed at all material times before the container is finally opened by the consumer the container and insert combination can be filled as easily, simply and quickly as conventional container. A disadvantage of this type of system is that the insert may  
35 contain a residual pressure after the container has been emptied. There is a risk a consumer will cut open the

empty container and thus be able to interfere with a pressurised insert.

WO-A-91/07326 discloses a very large number of ways in which the pressurized gas insert can be formed and mounted within the beverage container. In most examples, the insert is mounted so that, in use, it is located at a fixed position. However, an example is also described where the insert floats in the liquid in the container.

Although some of the prior art noted above does disclose the general idea of a floating insert none of the commercially adopted systems have used a floating insert. In general most of the systems which have been adopted rely on the insert being in a fixed position either to ensure that it works effectively on opening of the container or to ensure that it is charged with gas during pasteurisation. For example, if the insert described in EP-A-0,520,646 is displaced from its location adjacent the base of the container, when the container is inverted, the restricted orifice is not in the headspace during pressurisation and pasteurisation. Accordingly, the insert is filled with beverage and so does not operate as effectively as possible as a result of jetting liquid rather than gas.

Another problem which occurs with fixed inserts results from the way in which a container is handled during opening. When opening a bottle with a crown cork type closure the bottle is often tipped almost horizontally if opened using a fixed opener. Equally when opening an easy open feature, either a ring pull or a stay-on-tab on a can it is common to tilt the can on opening. In both cases, immediately after opening the closure the container is then tipped to dispense its contents. These actions can result in the restricted orifice of the insert not being immersed in the beverage whilst gas is being jetted from it. In such a case the insert does not function correctly.

SUMMARY OF THE INVENTION

According to the present invention, a carbonated beverage container includes a hollow insert having two opening means, one opening means arranged to allow gas to enter the insert from a headspace above the beverage, and the other opening means arranged to jet gas into the beverage from the insert upon opening the container, wherein one of the opening means is a one-way valve, and the other opening means is an orifice.

The present invention provides a beverage container with an insert which jets gas into the beverage, creating shear and so causing liberation of small bubbles of gas upon opening of the container, yet does not require the insert to be pre-pressurized.

Preferably the insert floats on the beverage. As the insert floats on the beverage, the insert may be dropped into the container before or after filling, and therefore the assembly of the container and insert is much simpler than for containers in which the insert is fixed in the container or is an interference fit in the container. As the insert floats, the problems of orientation, including gas not being jetted into the beverage, and beverage entering the insert, which are associated with fixed inserts, are overcome. Further, the nature of the containers is not critical since it is not necessary to form an interference fit with them, or adapt them specifically to hold the insert at a particular location.

Especially when the one-way valve is provided to jet gas into the beverage, it is preferred that the valve is a duckbill valve. Duckbill valves are particularly advantageous as the size of the aperture through which gas jets changes with pressure difference across the valve.

This ensures that the velocity of gas jetted through the valve is substantially constant during jetting.

The insert may be moulded from a plastics material  
5 such as polypropylene, or be formed of metal such as  
lacquered aluminium, lacquered tin plate, polymer coated  
aluminium, polymer coated tin plate or tin free steel.  
Where the insert is made of metal and the container is also  
made of metal, they are preferably both made of the same  
10 metal to facilitate re-cycling.

In the case of a plastics insert, the insert is  
preferably moulded in two parts which are snap-fitted or  
welded together. Preferably the insert has two substan-  
15 tially hemi-spherical ends connected by a substantially  
tubular portion, with the two opening means being provided  
in the curved walls of the tubular portion of the insert,  
and is arranged to float with its longitudinal axis  
parallel to the surface of the beverage. This is  
20 particularly advantageous as the insert is easily able to  
rotate into the required orientation with the opening means  
for jetting gas into the beverage below the surface of the  
beverage. This shape is advantageous for a floating  
insert. By controlling the buoyancy of the insert, a  
25 large volume of gas can be contained within the insert,  
whilst it is arranged to float with only a small amount of  
the insert being above the surface of the beverage. With  
the insert arranged in this way, only a small headspace is  
required, and this enables the insert to be used with  
30 conventional containers and does not require the "oversize"  
containers used with most head enhancing inserts.

The insert preferably includes a deformable portion so  
that, in its non-deformed state, the insert does not block  
35 or pass through a dispensing aperture of the container, and  
in its deformed state can be inserted into the container  
via the dispensing aperture. The deformable portion



preferably comprises a protrusion formed integrally with the remainder of the insert. The insert may be made from a resilient material, and be thin enough for it to be deformed around the protrusion or, alternatively the protrusion may be surrounded by a thinned or weakened portion. The opening means through which gas enters the insert is preferably located in the protrusion.

Alternatively, where the hollow insert is manufactured from metal, it preferably has a substantially circular base in which is mounted the opening means through which gas jets into the beverage, and an inverted cup shaped upper part which forms the side walls and top. The opening means through which gas enters the insert is mounted in the top. The side walls of the insert are preferably flared outwardly towards the bottom and the base received in this outwardly flared portion and held in place by rolling the bottom of the side walls to form an annular recess. In this case, it is advantageous to include a sealing material such as a can seal lining compound in the annular recess to seal the two parts of the insert together. Further, the compound covers the cut edges of the base and side walls, preventing these from corrosion which may otherwise impair the flavour of the beverage.

25

The base of the insert preferably includes an annular indented portion arranged towards the outside of the base. This is used to centre the base with respect to the side wall of the insert.

30

The one-way valve is mounted through a hole in the top or the base of the insert, the hole preferably having a diameter slightly smaller than the outside diameter of the valve. In this way, the edge of the hole bites into the elastomeric valves to some extent, and this protects the cut edges and prevents them contacting the beverage and corroding.

35

Preferably the insert is arranged so that the opening means through which gas jets is always below the surface of the beverage by providing orientating means, symmetrically arranged relative to the opening means. The insert is preferably symmetrical about a vertical axis with both opening means being located on this axis. The orientation means may have a positive or negative buoyancy relative to the beverage in which it is used. However, it is preferred that the material from which the insert is made has a negative buoyancy and that the base of the insert has a greater wall thickness.

The effective volume of the inside of the insert is preferably between 2 and 7 ml, depending upon the size of the container, and the type of beverage.

#### BRIEF DESCRIPTION OF DRAWINGS

Particular examples of the present invention will be described with respect to the accompanying figures in which:-

Figure 1 shows a sectioned perspective view of a first example of an insert for use in a container according to the present invention;

Figure 2 shows an enlarged sectional view of a portion of the insert of Figure 1;

Figure 3 shows a cross-section of a can containing a beverage, and the insert of Figure 1;

Figure 4 shows a sectioned perspective view of a second example of an insert for use in a container according to the present invention;

Figure 5 shows an enlarged sectional view of a portion of the insert of Figure 4;

Figure 6 shows a cross-section of a can containing a beverage, and the insert of Figure 4;

Figure 7 shows a cross-section of a bottle containing a beverage, and the insert of Figure 4;

Figure 8 shows a non-return valve;

Figure 9 shows a sectioned perspective view of a third example of an insert for use in a container according to the present invention; and,

Figure 10 shows a sectioned perspective view of a fourth example of an insert for use in a container according to the present invention.

10

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 1 shows a sectioned perspective view through a first example of an insert for a container according to the present invention. The insert 1 is made from lacquered aluminium and is designed for use in an aluminium container to facilitate re-cycling. The insert 1 has a circular base 2. The base 2 has a thickness of between 0.5 and 1mm. The sides and top 3 of the insert 1 are integrally formed in an inverted cup shape from aluminium of 0.2mm thickness. The thicker aluminium of the base 2 means that the insert 1 floats with the base 2 lowermost. An orifice 6 is provided in the top of the insert, and a one-way valve 7 is mounted in the base 2.

25

As shown more clearly in Figure 2, the side walls are flanged outwardly towards the bottom for receiving the base 2, and the edge 4 is rolled over to hold the base 2 in position. The base 2 has an indented annular portion 8, which is arranged towards the outside of the base 2. This is used to centre the base 2 with respect to the side walls of the insert 1. A sealing material 5 such as a foamed can seal lining compound is used to seal the side walls and base. This has two functions. Firstly, the compound seals the base 2 against the rolled end 4 of the side walls, thereby sealing and retaining the base 2 in position. Secondly, the compound 5 covers the cut edges of the base

35

2 and the side walls. This protects the cut edges, and prevents these from corroding, which would otherwise impair the taste of the beverage.

5           The one-way valve 7 is a TPE duckbill valve. The hole for the valve 7 is of a slightly smaller diameter than the diameter of the tubular body portion of the duckbill valve 7, so that the edges of the hole bite into the valve 7. This helps retain the valve 7, and prevents the cut edges  
10 of the insert 1 from being exposed to the beverage and corroded. The valve 7 includes an annular rib and a flange, which are positioned on either side of the hole to retain the valve 7.

15           The internal volume of the insert 1 depends upon the beverage 11 contained in the can 10, but is typically between 2ml and 7ml.

          Figure 3 shows the insert 1 as described above in a  
20 can 10 containing a carbonated beverage 11. When filling the can 10, the insert 1 is dropped into the can 10, and the can 10 and insert 1 are together flushed with inert gas to remove any oxygen from the inside of both can 10 and insert 1. The can 10 is then filled with carbonated  
25 beverage 11, dosed with liquid nitrogen, and sealed. After sealing the can 10, the contents are heated to pasteurise the beverage 11.

          During heating, the pressure in the can 10 increases.  
30 The increase in pressure allows gas from the headspace to enter the insert 1 via the orifice 6. The internal pressure of the insert 1 does not exceed the internal pressure of the can 10, so the one-way valve 7 remains closed. After pasteurisation, the beverage 11 cools and the  
35 internal pressure of the can 10 decreases. The internal pressure of the insert 1 then exceeds the internal pressure of the can 10, and the one-way valve 7 opens allowing gas

from the insert 1 to be ejected into the beverage 11. Some gas may also be ejected via the orifice 6. In this way, the internal pressure of the can 10 and the insert 1 remain in equilibrium.

5

Upon opening of the can 10, the internal pressure of the can 10 rapidly vents to atmospheric pressure. At this time, the internal pressure of the insert 1 is higher than that of the can 10, and accordingly gas from the insert 1 is jetted into the beverage 11 via the duckbill valve 7. As the orifice 6 has a small diameter, little gas is ejected through this. The jet of gas causes shear in the beverage 11 with a resulting liberation of a number of small bubbles which, as they rise through the beverage 11 in the can 10, form nucleation sites which trigger the liberation of further small bubbles throughout the beverage 11. As the beverage 11 is poured out of the can 10 and into a receptacle such as a drinking glass the bubbles from the top surface of the beverage are intimately mixed with the remainder of the beverage as it is dispensed. This triggers the release of further small bubbles throughout the beverage to give the appearance of dispensing the beverage 11 from draught.

25

The use of a duckbill valve 7 for jetting gas is especially beneficial since, as the pressure difference between the inside of the insert 1 and the inside of the can 10 reduces, the size of the aperture of the duckbill valve 7 also reduces, and the velocity of gas jetted into the beverage remains substantially constant until the internal pressures of the insert 1 and can 10 are substantially the same.

30

Figure 4 shows a second example of an insert 20 for use in the present invention. This insert 20 is made from plastics, and is especially useful where the container is a bottle.

35

The insert 20 includes two substantially hemispherical ends 21 joined by a tubular body portion 22. The insert 20 is formed from an upper part 23, and a lower part 24 which are snap fitted together.

5

The insert 20 includes a deformable portion 27, so that in its non-deformed state, the insert 20 is unable to pass through a dispensing aperture of a container, yet in its deformed state is able to pass through the aperture to  
10 allow the insert 20 to be inserted into the container. In this way, it is possible for the insert 20 to easily be inserted into a container, for example through the neck of a bottle, yet, when beverage is dispensed from the container the insert does not block or pass through the  
15 dispensing aperture. The deformable portion 27 is a protrusion provided on the upper part 23 of the insert 20. The upper part 23 of the insert 20 is formed entirely of thin plastics material allowing the insert to be deformed, although a weakened portion may alternatively be provided  
20 to allow the insert to be deformable. The protrusion 27 includes an orifice 28.

The lower part 24 of the insert 20 is made with a greater wall thickness than the upper part 23 so that the  
25 insert 20 tends to float with the lower part 24 lowermost since the plastics material has a negative buoyancy. The lower part 24 includes a central recess 25 in which a one-way valve 29 is mounted. In this way, the one-way valve 29 is protected from damage by the walls of the  
30 insert 20 which surround the lips of the valve 29. Further, the opening of the one-way valve 29 inside the insert 20 is above the bottom of the insert 20. In the unlikely event of liquid entering the insert 20, the liquid will be below the height of the opening of the valve 29, and so no liquid  
35 will be jetted from the insert 20 when the container is opened.

As shown in Figure 5, the upper part 23 of the insert 20 includes a circumferential groove 31 around its side wall. The lower part 24 includes a first upstanding rib 32 which is shaped to interlock with the groove 31. This arrangement allows the upper part 23 and the lower part 24 to snap fit together. A second upstanding rib 33 extends from the lower part 24, and contacts the inner face of the side wall of the upper part 23, opposite the circumferential groove 31. When the upper and lower parts 23,24 of the insert 20 are snap fitted together, the opposed ribs 32,33 sandwich the side wall of the upper part 23, thereby retaining the two parts 23,24. When a pressure difference exists between the inside and outside of the insert 20, the ribs 32,33 prevent radial movement of the side walls of the upper part 23, and thereby prevent the upper and lower parts 23,24 from disengaging when the insert is subjected to large pressure differences between its inside and outside.

Figure 6 shows the inclusion of the second example of insert 20 in a can 35.

Figure 7 shows a bottle 40 including the second example of the insert 20. To fill the bottle 40, the insert 20 is deformed and pushed through the neck of the bottle 40. When the insert 20 is in the bottle 40, it returns to its normal state, in which it is too large to fit through the neck of the bottle 40. The bottle 40 and insert 20 are then flushed with inert gas to remove any oxygen, and the bottle 40 is filled with beverage 11, dosed with liquid nitrogen and sealed. The beverage 11 is then heated to pasteurise the beverage 11, and this increases the internal pressure of the bottle 40. As with the first example described above, internal pressure of the insert also increases as gas enters the insert 20 via the orifice 28. When the bottle 40 is opened, the gas inside the insert 20 jets into the beverage 11 causing shear, and

forming a close knit creamy head on the beverage as described above. As the beverage 11 is dispensed, it is not possible for the insert 20 to pass through the neck of the bottle 40, as a result of the projection 27 and so the  
5 insert 20 is not accidentally dispensed along with the beverage 11.

Other valves can be used in place of a duckbill valve. Figure 8 shows a non-return valve 50 comprising a hollow  
10 body having a circular cross-section with an upper end wall 51 having an inlet port 52, and a lower end wall 53 including a restricted orifice 54. The inner surface of the lower end wall has a pair of lugs 55 projecting therefrom. A circular disk valve 56 is provided within the  
15 body. When a pressure is exerted from the outside of the body through the restricted orifice 54, the valve disk is urged towards the upper end wall, and seals the inlet port 52 to prevent the flow of gas through the body. When pressure is applied through the inlet port 52, the valve  
20 disk 54 is urged onto the lugs 55, which prevent the disk 56 from sealing the restricted orifice 54. Accordingly, gas can flow through the valve 50.

In both examples described above, the one-way valve  
25 to be provided at the top of the insert to allow gas to enter the insert, with the orifice at the bottom of the insert through which gas jets into the beverage. This arrangement is shown in Figures 9 and 10. In this case, when the container including the beverage is sealed, the  
30 pressure in the container increases compared to that in the insert. This pressure difference causes the one-way valve 31, 32 to open, and gas from the headspace enters the insert to charge this to a pressure substantially the same as that in the container. As the container cools, the  
35 pressure in the container falls. Gas from the insert is ejected through the orifice 33, 34 into the beverage, and the insert and container are kept in equilibrium. When the



15

container is opened, the pressure in the container is  
vented to atmospheric pressure. The insert is therefore at  
a higher pressure than the inside of the container, and  
accordingly gas jets through the orifice 33, 34 into the  
5 beverage, thereby creating shear in the beverage and  
forming a close-knit creamy head as described above. The  
gas cannot escape through the one-way valve 31, 32 as this  
prevents gas from flowing out of the insert.

10

C L A I M S

1. A carbonated beverage container (10, 35, 40) including a hollow insert (1, 20) having two opening means (6, 7, 28, 29, 31, 32, 33, 34), one opening means (6, 28, 31, 32) arranged to allow gas to enter the insert (1, 20) from a headspace above the beverage (11), and the other opening means (7, 29, 33, 34) arranged to jet gas into the beverage (11) from the insert (1, 20) upon opening the container (10, 35, 40), wherein one of the opening means (7, 29, 31, 32) is a one-way valve, and the other opening means (6, 28, 33, 34) is an orifice.
2. A carbonated beverage container (10, 35, 40) according to claim 1, in which the insert (1, 20) floats on the beverage (11).
3. A carbonated beverage container (10, 35, 40) according to claim 1 or 2, in which the one-way valve (7, 29, 31, 32) is a duckbill valve.
4. A carbonated beverage container (35, 40) according to any one of the preceding claims, in which the insert (20) is moulded from a plastics material.
5. A carbonated beverage container (35, 40) according to claim 4, in which the insert (20) is moulded in two parts which are snap-fitted or welded together.
6. A carbonated beverage container (45, 40) according to claim 4 or 5, in which the insert (20) has two substantially hemispherical ends (21) connected by a substantially tubular portion (22), with the two opening means (6, 7, 28, 29, 31, 32, 33, 34) being provided in the curved walls of the tubular portion (22) of the insert (20), and is arranged to float with its longitudinal axis parallel to the surface of the beverage (11).

7. A carbonated beverage container (35, 40) according to any one of the preceding claims, in which the insert (20) includes a deformable portion (27) so that, in its non-deformed state, the insert (20) does not block or pass  
5 through a dispensing aperture of the container (35, 40), and in its deformed state can be inserted into the container (35, 40) via the dispensing aperture.

8. A carbonated beverage container (35, 40) according to  
10 claim 7, in which the deformable portion (27) comprises a protrusion formed integrally with the remainder of the insert.

9. A carbonated beverage container (35, 40) according to  
15 claim 8, in which the insert (20) is formed from a resilient material, thin enough for it to be deformed around the protrusion.

10. A carbonated beverage container (35, 40) according to  
20 any one of claims 8 or 9, in which the opening means (28, 32) for allowing gas into the insert (20) is located in the protrusion.

11. A carbonated beverage container (10) according to any  
25 of claims 1 to 3, in which the container is formed from the same material as the insert (1) to facilitate recycling.

12. A carbonated beverage container (10) according to  
30 claim 11, in which the insert (1) is made of metal, and has a substantially circular base (2) in which is mounted the opening means (7, 33) for jetting gas into the beverage (11), and an inverted cup shaped upper part (3) which forms the side walls and top, in which is mounted the  
35 opening means (6, 31) for allowing gas into the insert.

13. A carbonated beverage container (10) according to claim 12, in which the side walls of the insert (1) are flared outwardly towards the bottom and the base (2) is received in this outwardly flared portion and held in place by rolling the bottom (4) of the side walls to form an annular recess.

14. A carbonated beverage container (10) according to claim 13, in which a sealing compound (5) is included in the annular recess.

15. A carbonated beverage container (10) according to any one of claims 12 to 14, in which the base (2) of the insert (1) includes an annular indented portion (8) arranged towards the outside of the base (2) to centre the base (2) with respect to the side wall of the insert (1).

16. A carbonated beverage container (10) according to any one of claims 12 to 15, in which the valve (7, 31) is mounted through a hole having a diameter slightly smaller than the outside diameter of the valve (7, 31).

17. A carbonated beverage container (10) according to any of the preceding claims in which the insert (1) includes orientating means, symmetrically arranged relative to the opening means (7, 33) through which gas is jetted into the beverage.

18. A carbonated beverage container (10) according to any of the preceding claims, in which the insert (1) is symmetrical about a vertical axis with the two opening means (6, 7, 31, 33) being located on this axis.

1/5

Fig.1.

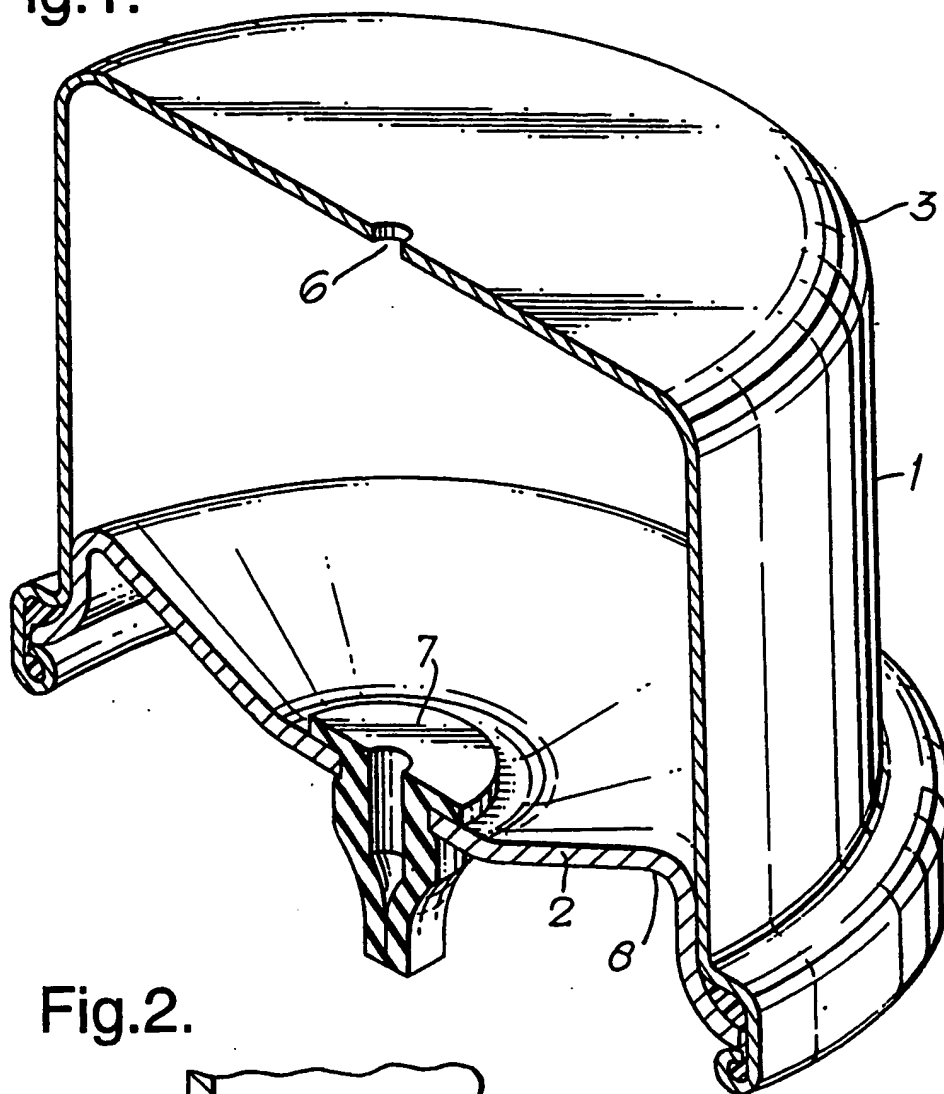
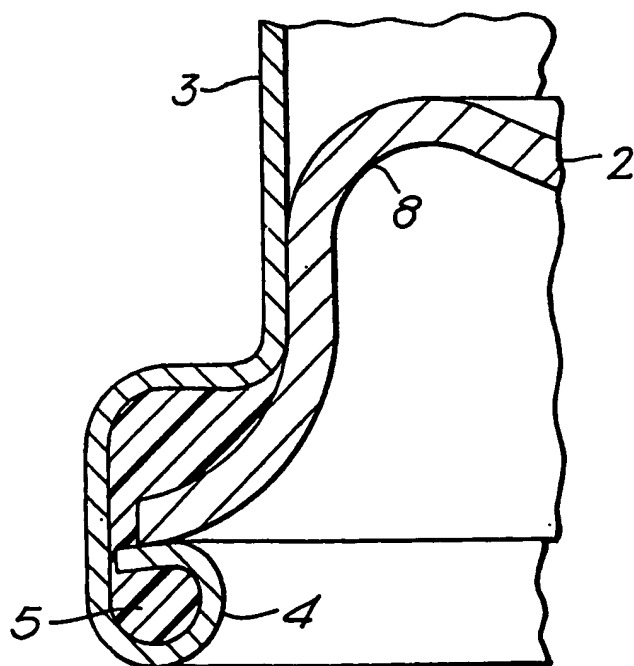


Fig.2.



2/5

Fig.3.

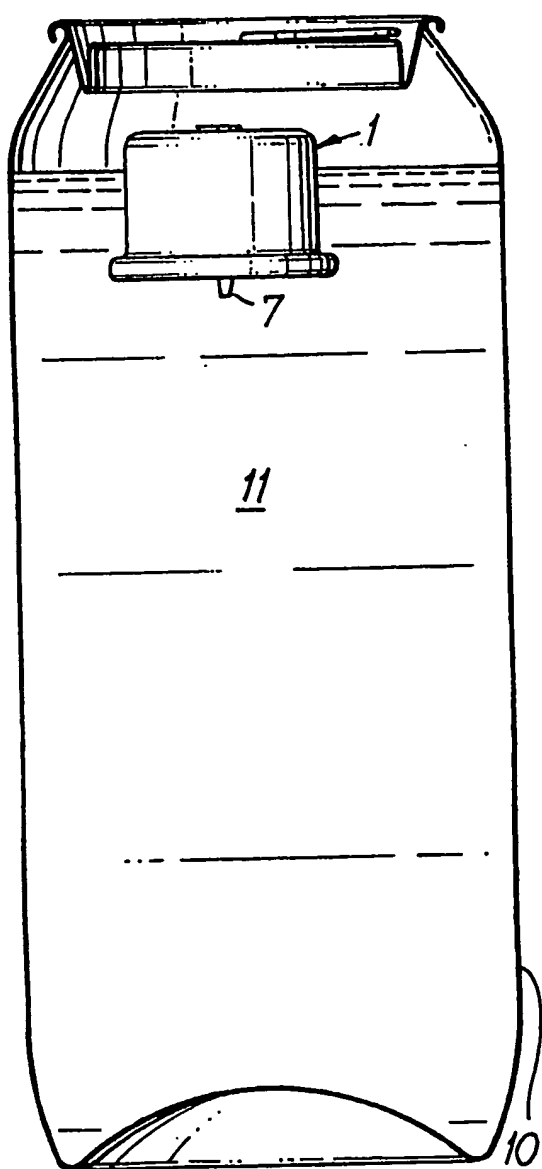
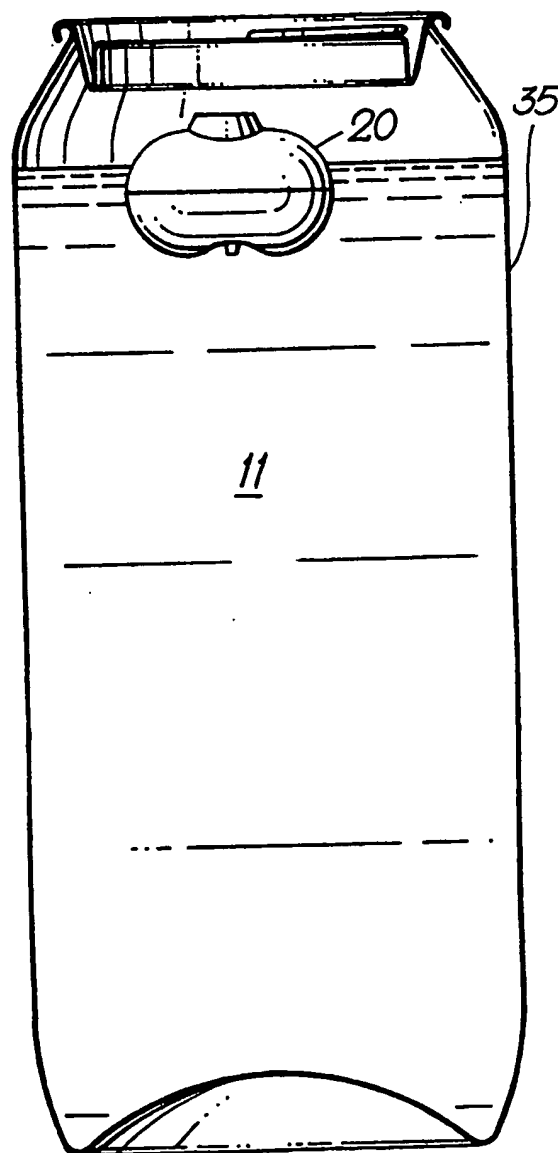


Fig.6.



3/5

Fig.4.

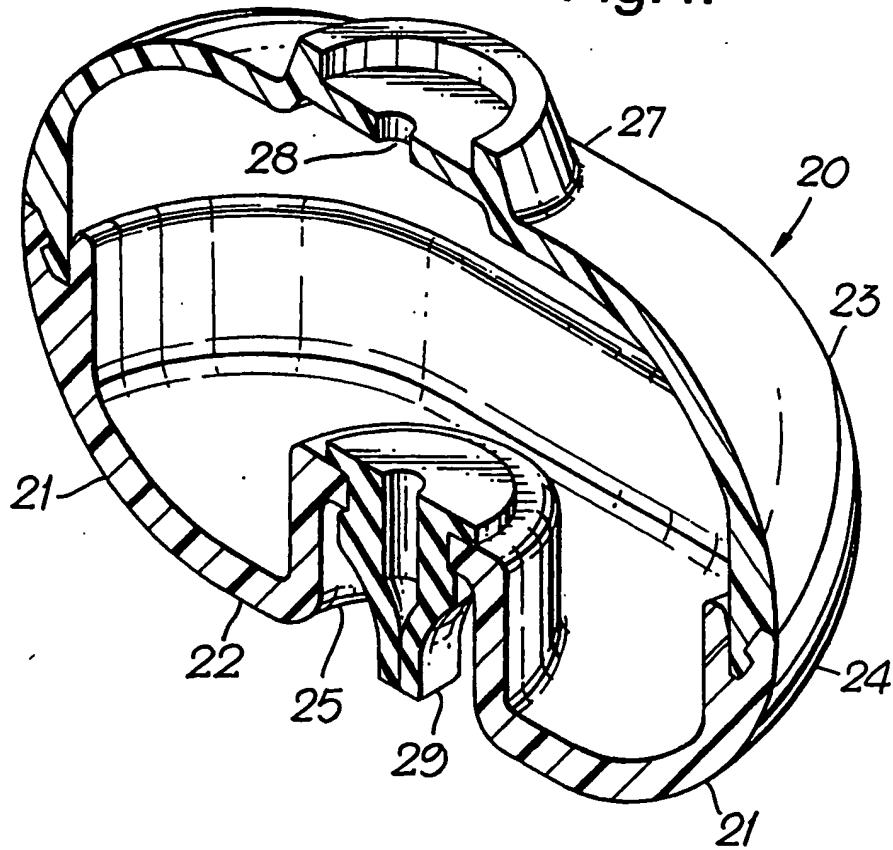
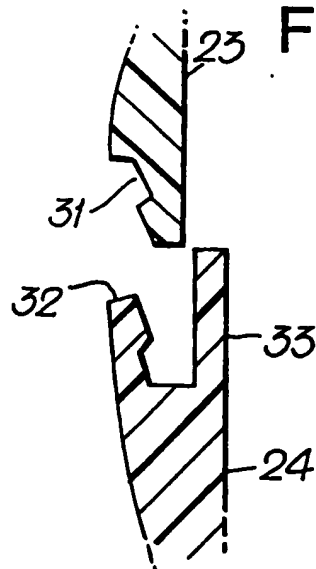


Fig.5.



4/5

Fig.7.

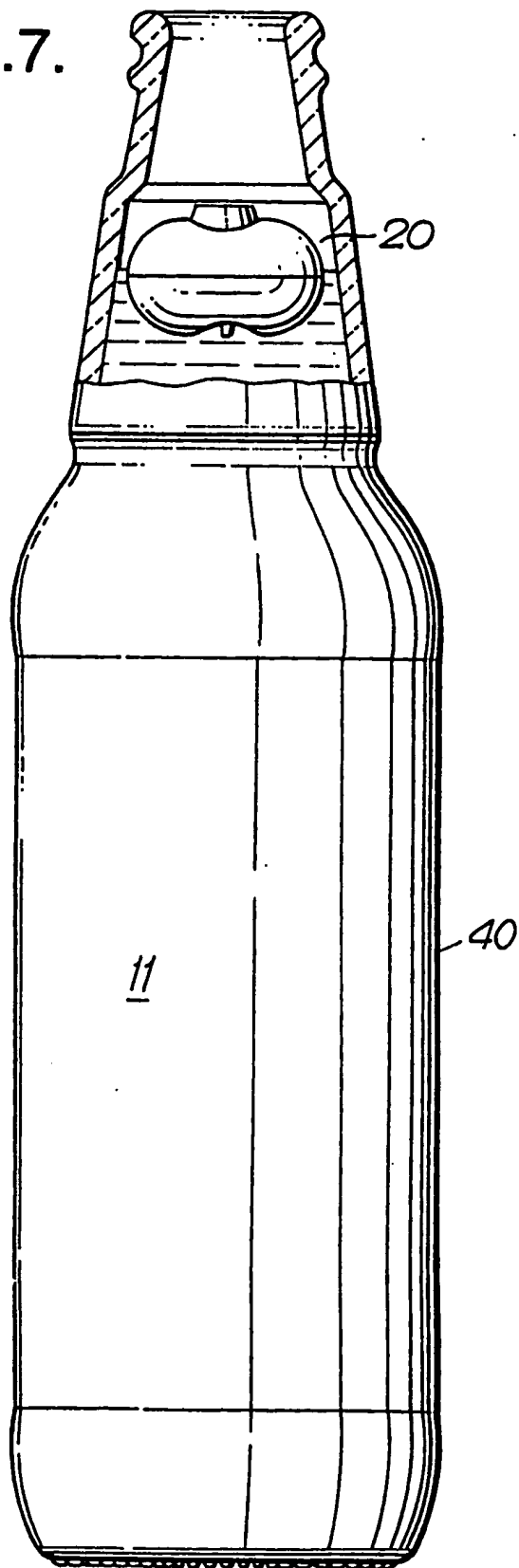
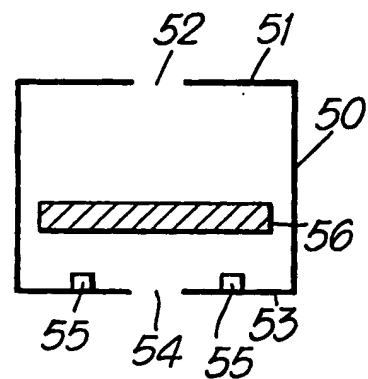


Fig.8.





5/5

Fig.9.

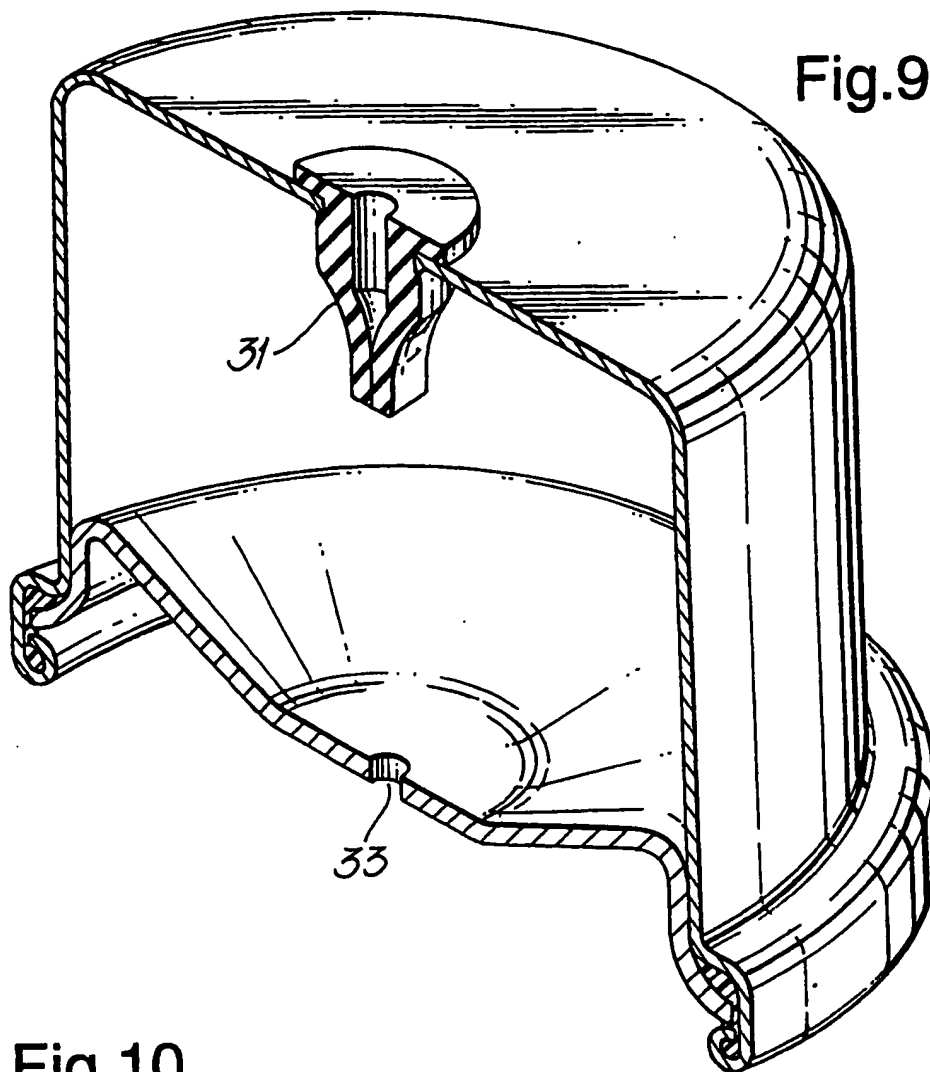
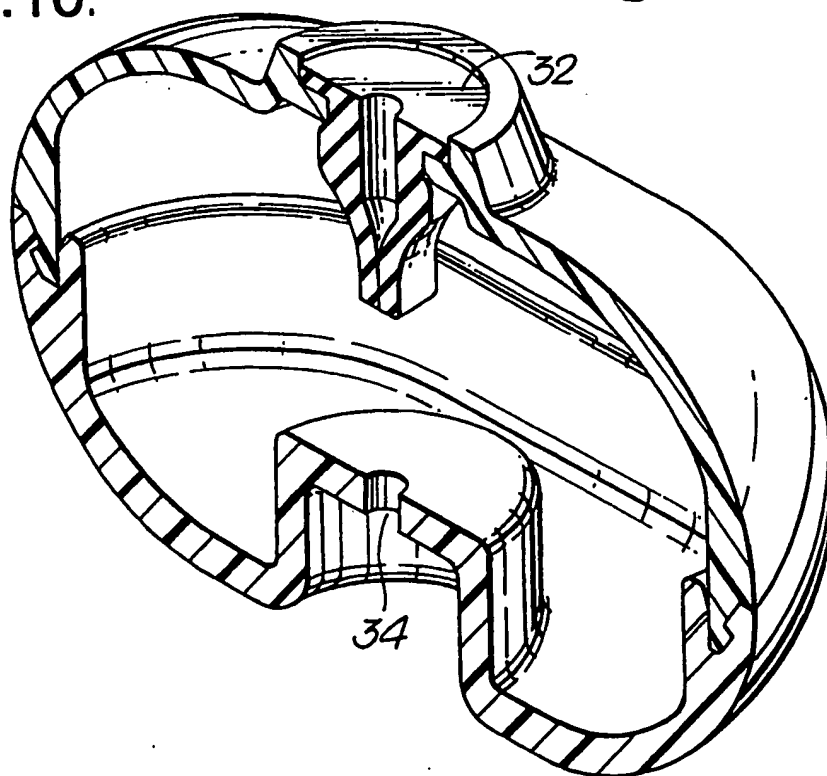


Fig.10.



**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 6 B65D79/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

 Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	GB,A,2 267 882 (SCOTTISH & NEWCASTLE PLC) 22 December 1993 see abstract; figure 1 ---	1,2,4,5
A	WO,A,91 07326 (WITHBREAD COMP.) 30 May 1991 cited in the application see page 15, line 6 - line 8; figure 2 ---	1-3
A	WO,A,93 09055 (SCOTTISH & NEWCASTLE PLC) 13 May 1993 see abstract; figure 10 ---	1,3
A	EP,A,0 349 053 (JACO C.V.) 3 January 1990 see column 4, line 28 - line 33; figures 1,2 see abstract; figures 1,2 ---	1
-/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

6 October 1994

Date of mailing of the international search report

11. 10. 94

Name and mailing address of the ISA

 European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Zanghi, A

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	EP,A,0 577 284 (GUINNESS BREWING WORLDWIDE) 5 January 1994 see abstract; figure 1 ---	1
P,A	EP,A,0 594 221 (WITHBREAD) 27 April 1994 ---	
A	WO,A,93 10021 (B.FRUTIN) 27 May 1993 -----	

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A-2267882	22-12-93	NONE	
WO-A-9107326	30-05-91	CN-A- 1054399 EP-A- 0502059 EP-A- 0594221	11-09-91 09-09-92 27-04-94
WO-A-9309055	13-05-93	AU-A- 2890692 CA-A- 2122737 EP-A- 0610312	07-06-93 13-05-93 17-08-94
EP-A-0349053	03-01-90	BE-A- 1001856 BE-A- 1002676 AU-B- 613774 AU-A- 3713789 DK-B- 169142 JP-A- 2191564 OA-A- 9080 PT-B- 91008 SU-A- 1713435 US-A- 4995533 US-A- 5090595	20-03-90 30-04-91 08-08-91 04-01-90 29-08-94 27-07-90 31-10-91 30-06-94 15-02-92 26-02-91 25-02-92
EP-A-0577284	05-01-94	GB-A- 2268151 AU-B- 4150993 JP-A- 6080145	05-01-94 06-01-94 22-03-94
EP-A-0594221	27-04-94	CN-A- 1054399 EP-A- 0502059 WO-A- 9107326	11-09-91 09-09-92 30-05-91
WO-A-9310021	27-05-93	AU-A- 2913292 AU-A- 2916492 CA-A- 2123233 EP-A- 0611359 WO-A- 9310022	15-06-93 15-06-93 27-05-93 24-08-94 27-05-93

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**